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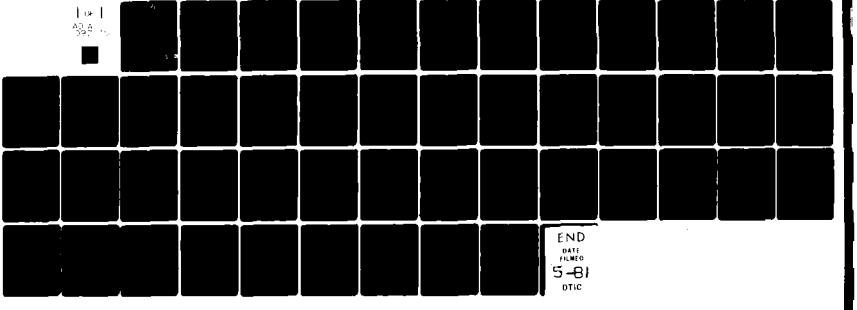

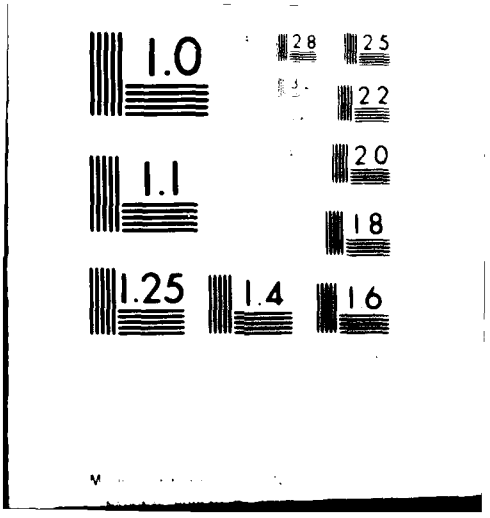
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BELTZVILLE LAKE PROJECT

WATER QUALITY DATA REPORT (RCS DAEN-CWE-15)

Prepared By

U. S. Army Corps of Engineers
Philadelphia District

TIME PERIOD
OCTOBER 1, 1979 TO SEPTEMBER 30, 1980

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20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*

Beltzville Lake, located on the Pohopoco Creek in Carbon County, northwest of Allentown, Pa, has been in operation since 1970.

This report presents and briefly interprets the water quality data collected through 1980 related to the operation of the Beltzville Lake Project. It includes the general characteristics of the area influenced by the dam, the project itself, and the basin draining into the lake. The report presents

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data and information useful to the operation of Beltzville Lake for water quality control in the lake and downstream.

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SUMMARY

1.01. Summary. Beltzville Lake, located on the Pohopoco Creek in Carbon County, Northwest of Allentown, Pennsylvania, has been in operation since October of 1970. The primary purposes of the project are flood control, water quality control, future water supply, low flow augmentation and recreation. This report, which covers the time period beginning 1 October 1979 through 30 September 1980 deals with the water quality aspect of the project. The drainage basin above Beltzville Dam which was formerly devoted principally to farming is presently undergoing a land pattern change apparently due to the influence of Beltzville Lake. Farm land is being sold for building lots and new homes are being constructed throughout the basin. It appears that in addition to contamination from animal runoff, there may be an increase in septic tank seepage, which may become a concern in future lake management. In general, accumulated data 1/ (APPENDIX A) indicate that stream inflow and the reservoir areof high water quality. The collected data also indicated a favorable comparison with untreated water quality for public water supplies as adopted by the Commonwealth of Pennsylvania (DER) and U. S. Environmental Protection Agency.

1/ BMC , Water Quality Management Report (1980).

The reservoir exhibits a moderating effect on water quality and the very slight acidic conditions and nutrient loadings associated with ammonia nitrogen and phosphorous have been nicely controlled to prevent any shocks on receiving streams. In general, following periods of heavy precipitation there is a slight increase in ammonia nitrogen and phosphorous and a decrease in pH. This is associated more with runoff from surrounding areas and is not a direct function of the reservoir.

Water Quality monitoring presently is constrained by available funding. During FY 80, bacteriological testing was continued at all sampling points in addition to chemical testing that was being done for the past several years. Future management efforts will require additional Biological Data to meet the criteria established by the Commonwealth of Pennsylvania (DER). 1/

SECTION II - INFORMATION

2-01. Purpose and Scope. This report presents and briefly interprets the water quality data collected through 1980 related to the operation of the Beltzville Lake Project. It includes the general characteristics of the area influenced by the dam, the project itself, and the basin draining into the lake. The report presents data and information useful to the operation of Beltzville Lake for water quality control in the lake and downstream.

1/ Commonwealth of Pennsylvania (DER) Chapter 93. Water Quality Criteria.

2-02. Authority. This report is submitted in accordance with the Corps of Engineers policy as set forth in ER 1110-2-334, "Water Quality Management at Corps Civil Works Facilities," 1 May 1974.

2-03. Background Information. Beltzville Dam, located in Northeastern Pennsylvania, (Plate 1) was completed in 17 September 1971. The pool was raised to elevation 628.0 in December 1971 and the project has been in operation ever since. The project is one of five flood control dams in the Lehigh and Delaware River Basin. In addition Beltzville functions for water quality, water supply and recreation.

2-04. Pertinent References. The following references are considered pertinent to this report, (ER 1110-2-1402 and 1130-2-415).

a. U. S. Army Corps of Engineers, Philadelphia District, Lake Profiles on Dissolved Oxygen, pH, and Temperature (APPENDIX B).

b. Water Quality Management Report - Contract DACW61-79-D-0013 (APPENDIX A)

SECTION III - AREA AND PROJECT DESCRIPTION

3-01. River Basin Characteristics. Beltzville Lake is located in Carbon County in northeastern Pennsylvania on the Pohopoco Creek, a tributary of Lehigh River (Plate 1). The Pohopoco Creek drainage area is 111 square miles and the portion above the damsite is 93.3 square miles. The drainage area above the dam was principally devoted to agricultural production prior to the construction of the dam; however, land patterns are changing due to the increase of housing construction. Lands formerly devoted to agricultural pursuits are fast becoming recreation-oriented.

However, with the increase of housing, additional causes of concern arise from septic overflows due to the lack of sewerage systems in the watershed. Periodic nutrient lake loading occurs occasionally but this is minimal and no adverse effects have been noticed on water quality. These effects are counterbalanced by the flushing action caused by early spring and fall rainfall.

3-02. Project Description. The Beltzville project, completed in 1971, provides supplies of water, reduction of flood damage and facilities for public recreation. The dam is built across Pohopoco Creek about one-third of a mile from its juncture with Sawmill Run, and about 4 miles east of Lehighton, Pa. The dam extends 4,300 feet across the Pohopoco Valley and rises 170 feet above the creek bed. The water in the lake discharges through a conduit located near the southern end of the dam. The lake, when filled to its normal level is five miles long. The elevation of the lake is 628 feet above sea level. The lake provides a recreation capacity for 250,000 visitors annually; however, the Pennsylvania Bureau of State Parks recently reported 579,370 visitors at Beltzville. (calendar year 1979) The three major recreational sites are; Pine Run area presently developed while the remaining two, Trinity Gorge and Twinflower, are undeveloped.

3-03. Climate. The Lehigh River Basin, including the area drained by Pohopoco Creek, has a temperate northeast Atlantic coast climate that is characterized by frequent changes in temperature and occasional moderate amounts of precipitation. The area is subject to precipitation from normal rainfall, thunderstorms, snowfall, and heavy rains associated with hurricanes. The mean annual temperature in the Lehigh River Basin is

about 50°F. The mean monthly precipitation during 1979 varied from a minimum of 1.12 inches in July to a maximum of 7.82 inches in May, as recorded by the U. S. Weather Service at Beltzville. Selected climatological data for 1979 is found in Table 1.

3-04. Dam and Lake Characteristics.

a. Embankment. The dam is a rock faced earth embankment with an impervious core and random fill outer sections, has a crest length 4,200 feet with a maximum height of 170 feet above the stream bed. The top of

the dam is at elevation 672 feet (sea level datum). The embankment has a top width of 30 feet. The top of the dam is surfaced with gravel to serve as a maintenance road. Access to an intake tower is by a service bridge.

b. Spillway. The spillway contains a concrete crest 275 feet wide and approximately 325 feet long approximately centered in an upland channel cut into the right bank. The spillway discharge after leaving the unlined downstream section, will flow in a natural valley into Sawmill Run and Pohopoco Creek.

c. Outlet Works. The outlet works is located near the center of the dam and consists of a control tower and multi-level intake structure located on the upstream side of the dam. The tower leads gated water passages through the dam and a conventional stilling basin is provided at the downstream end to dissipate the energy of the conduit discharge.

d. Access Roads to Dam. Access to the top of the dam is directly from the operations building on the right bank via a bridge crossing the spillway channel.

e. Reservoir. The reservoir when filled to the top of the water supply pool, elevation 628, is approximately seven miles long and ½ mile wide at point of maximum width. The average depth of the reservoir is about 60 feet and the maximum is 125 feet. The stream slopes vary from about 310 feet per mile to about 5 feet per mile. The topography includes

all land classification types from rolling farmland to sheer rock faces. The flood plain in the reservoir area has been developed as a recreational and farming area.

3-05. Geological History.[1/] The area is located in the middle portion of the Appalachian Valley and Ridge physiographic province. Pohopoco Creek flows parallel to the northeast-southwest trending ridges and is incised in gently sloping Devonian shales, siltstones, and sandstones. The project area contains outcroppings of what is thought to be the Centerfield coral reef. This formation, which is rich in fossils, dates back to the Devonian period. There is also evidence that changes in the structure of the earth's crust created lagoons during the Mississippian period. Some of the marine life that inhabited these lagoons has been identified in fossils found in the project area.

3-06. Topography. The difference in elevation between the valleys and ridges in the project area is about 400 feet. A number of deep narrow gorges, most of which are located on the gently sloping north side of the reservoir site, are aligned generally perpendicular to the creek. A high, steep ridge forms the south side of the valley. The ridge is particularly steep near the dam site and upstream portion of the reservoir site. It recedes slightly to the south near the mid-point of the reservoir, leaving a pocket of relatively flat land on the south side of the project area.

1/ A detailed geological description can be found in the Beltzville Dam and Reservoir Memorandum 3(GDM) and the Recreation-Resource Management DM No. 18A, U. S. Army Corps of Engineers, Philadelphia District.

3-07. Soil Condition. Glacial frost action south of the Wisconsin terminal moraine produced a channery condition of the soil surface layer. Channery soils are predominant in the project area. They contain thin flat fragments of sandstone, limestone, or shale as much as six inches in length along the longer axis. These fragments are thickly interspersed throughout a silt loam.

3-08. Vegetation. Nearly all relatively flat lands have been cleared and farmed for many years. Uncleared land contains an abundance of second growth hardwoods including species such as red maple, various oaks, ash, hickory, birch, dogwood, sassafras and hawthorn. The slopes of both gorges and ridges are forested with dense stands of hemlock and rhododendron and a scattering of other conifers and hardwood species.

3-09. Land Use. Government lands are recreationally oriented and are divided into picnicking, swimming, boating, hunting, sightseeing, water-skiing, and fishing. Pennsylvania Bureau of Parks manages the recreational areas, the Pennsylvania Fish Commission manages the lake waters and the Game Commission is responsible for the management of the game lands.

The area north and east of the lake were formerly devoted to Agricultural production, however for the past several years, land patterns have changed drastically. Dairy farm operations are being phased out and the land is being developed for homes and recreational businesses.

The land to the south of the lake is a pine-hemlock-hardwood forest which in turn is bordered to the south by more farm and forested lands.

SECTION IV - WATER QUALITY DATA

4-01. Purpose of Sampling Program. The purpose of taking water samples at Beltzville Lake is to acquire an inventory of water quality parameters within the areas influencing and influenced by the lake. These data will be used to evaluate water quality conditions and to determine where, what and if any pollution problems exist in the watershed. It is further anticipated that positive action will be initiated to contain, control or eliminate any point or non-point sources of pollution or contamination. Additionally, it is the intent of the Corps to develop a meaningful program to characterize the lake with respect to standards of the Pennsylvania Department of Environmental Resources under provisions of the Clean Streams Law, Act of June 22, 1937, P.L. 1987.

4-02. Testing Procedures. Water samples are being collected on a year round basis under contract with the Corps of Engineers. These samples are being analyzed by a certified laboratory (under contract) for pH, dissolved oxygen, total dissolved solids, ammonia, specific conductance, nitrite, nitrate, and phosphorous. Stratification testing procedures (APPENDIX B) are being continued on the basis of twice per month from April

through November and once per month for the remainder of the year. Temperature readings, specific conductance, dissolved oxygen and pH are taken at prescribed depths and documented. Coliform samples 1/ are also collected at the same time as the water quality samples and processed within twenty-four hours by a certified laboratory under contract to the Philadelphia District. The fecal coliform samples, were collected and analyzed by contracted laboratories. The current fecal coliforms standards for swimming beaches is 200 fecal col/100ml of sample and this was not exceeded at any time during 1979. Water samples collected from Corps Headquarters are fully in conformance with Pennsylvania Drinking Water Standards.

1/ APPENDIX A - Water Quality Management Report (BMC)

4-03. Data Available. Considerable data, collected as a basis for project regulation, are available for analysis. Water quality data; (temperature, dissolved oxygen, conductivity, pH, phosphorous, total dissolved solics, nitrate, nitrite, ammonia, and total coliform has been collected and documented on a regular bi-monthly basis for the past yr. Additional data is available from other sources such as the Pennsylvania Dept. of Environmental resources, U. S. Geological Survey, Pennsylvania Fish Commission and information collected and catalogues by the Philadelphia District, Corps of Engineers. The Environmental Branch has conducted coordination meetings with the Pennsylvania Department of Resources and has encouraged the Water Quality Department to assist in the collection and testing of additional water samples to cover other parameters which are presently not being analyzed. The Corps is also requesting Pennsylvania DER to expand their program to include biological, algal biomass, and chloryphyll studies.

4-04. Low Flow Augmentation. Beltzville Lake is regulated for downstream water quality, low flow augmentation, and recreational purposes. Regulation of this project for water supply purposes is also a factor. The following paragraphs describe the necessary regulation requirement and objectives for each of the designated purposes.

a. Pohopoco Creek. A minimum release requirement of 35 cfs has been established to meet downstream requirements of Pohopoco Creek. Of this total release, 3 cfs is required to meet the established future requirements of the Palmerton Water Company, municipal and industrial

water supplier in the vicinity of Palmerton, Pa. The additional 4 cfs will provide adequate stream flow between the water supply intakes and the mouth of Pohopoco Creek. These releases will be made through the water quality outlet system.

b. Lehigh River. A desirable minimum flow of 400 cfs at Bethlehem, Pa was established in House Document 522, 87th Congress, 2nd Session. At present, until other goals are established along the Lehigh River, it will be the task of Beltzville Lake and F. E. Walter Dam to augment all deficient flows as necessary to bring the flow at the Bethlehem gage to 400 cfs.

(1) During drought conditions when F. E. Walter Dam is below conservation pool (elev. 1300.0), Beltzville Lake will have to supply all flows necessary to augment the Bethlehem goal.

(2) All low flow augmentation releases will be made through the water quality outlet system. The minimum release limit will be 35 cfs and the maximum approximately 400 cfs (normal pool elev. 628.0)

c. Delaware River. The Delaware River Basin Commission presently in coordination with other interested agencies is evaluating low flow goals at Trenton, New Jersey.

(1) Until such time as a new goal may be established, a goal of 3,000 cfs at Trenton will be used. Beltzville Lake releases may at times be based on amounts requested by the (USGS) Delaware River Master Office at Milford, Pa.

(2) Flows required in excess of 400 cfs (approximate capacity of the water quality outlet system) will have to be requested and approved by the Delaware River Basin Commission and the District Engineer. These excess releases will necessitate the use of the flood control outlet system.

d. Water Quality. The 27,880 acre-feet allocated for future water supply storage at Beltzville Lake has been contracted to the Government to the Delaware River Basin Commission. All releases are being made through the water quality outlet system. The range of releases will vary from a minimum of 35 cfs to a maximum of approximately 400 cfs.

First use of a portion of this water supply shortage was made on 18 Oct. 80. This was in addition to the water quality shortage which was also used on combating low flow (drought) conditions in the Delaware River Basin.

The U. S. Fish and Wildlife Service in conjunction with the Pennsylvania Fish Commission have indicated preferences in regard to the temperatures of releases from Beltzville Lake. Fish will be stocked below the dam in the tailwater, as well as in the lake. The fishing below the dam will be primarily for trout. The interested agencies have requested that releases for the summer months have temperatures that range between 50-65 degrees Fahrenheit. During other times of the year a temperature as close as possible to this optimum will be desired.

Bi-monthly stratification monitoring data, will provide an indication as to the location of water in storage having specific temperatures, dissolved oxygen and pH readings; it also provides a guide for selecting the most desirable combination of intake ports to satisfy downstream water quality requirements.

SECTION V - INTERPRETATION OF DATA

5-01. General Post-impoundment Conditions. Analysis of data collected by USGS indicated that the water quality generally is good with little or no effect caused by the outflow from Beltzville Lake. The problems of algae growths and coliforms in the lake are insignificant.

Water samples have been taken by the park superintendent and tested for coliforms on a weekly basis at two beach locations beginning in May until the closing down of the beach area in September. The analysis indicates that the coliform bacteriological test results are within the allowable limits of water quality standards for swimming areas under provisions of the Clean Streams Law, reference Title 25, Chapter 193 of Public Law 177 as amended, Commonwealth of Pennsylvania.

Bi-monthly stratification monitoring data, will provide an indication as to the location of water in storage having specific temperatures, dissolved oxygen and pH readings; it also provides a guide for selecting the most desirable combination of intake ports to satisfy downstream water quality requirements.

It has been observed that the lake each summer has been anerobic in the deep portions. Releases, however, have not been deficient in dissolved oxygen. Reaeration of water as it passes through the flood control conduit and stilling basin has been sufficient to elevate dissolved oxygen (DO) levels to near saturation. (See Appendix A).

a. Water Chemistry.

(1) Nitrogen. The nitrogen concentrations in Beltzville Reservoir react as expected: the highest levels are at station B-5 where the effect

of runoff is least modified. Stations B-1 and B-3 show the moderating effects of the reservoir and station B-4 reflects the effect of the Wild Creek Reservoir. Station B-1 reflects the concentrating effect of the reservoir since the peaks and valleys are higher than the stations in the reservoir. Runoff appears to be the major source of nitrogen in the lake. This is particularly noticeable in the spring and fall when large quantities of nitrogen based fertilizers are used by farmers in the area drained by the Pohopoco Creek. The ammonia nitrogen concentrations are more readily affected by rainfall than the other forms of nitrogen. Nitrate nitrogen concentrations exceed those mentioned by some sources as being necessary for excessive algae populations. Whether these high concentrations exist throughout the lake or only on the surface is not known. However, nuisance algae blooms have not been a continuing problem since the lake was filled. The effect of the lake stratifying is reflected in the ammonia nitrogen curves for station B-1 during the summer. Since nitrate and nitrite nitrogen are reduced to ammonia nitrogen when oxygen is limiting, the downstream discharges should be highest in ammonia when the lake is stratified. This held true during the summer. The spring and fall overturns will also bring ammonia compounds from the hypolimnion to the epilimnion. This may be the source of the ammonia peaks in mid-April and early September. However, historical data is lacking to confirm this opinion.

Generally the nitrogen levels in the reservoir are elevated. The lack of severe algae blooms indicates that nitrogen may not be a problem but algae data has not been collected for this lake. Although there may not be a problem, a present build-up of nitrogen in the benthos may create a problem.

(2) Phosphates. The Phosphate concentrations found below the dam stayed relatively low and constant, with the exception of a peak during the month of April. The peaks tended to be highest at stations B-4 and B-5; Wild Creek and tributaries and Pohopoco Creek and tributaries. The upper reaches of Pine Run showed low concentrations of Phosphates with very little fluctuation. The occasional high readings at station B-4 may be the result of phosphate laden water being released from the Bethlehem Water Supply Reservoirs. The wide fluctuation in the peaks of the curves tend to support this conclusion since water is released only when the supply of water exceeds the demand.

(3) Dissolved Oxygen. 1/ Dissolved oxygen is adequate in all feeder streams and in the reservoir itself. During the summer the D.O. readings while the lake was stratified dropped to 4.19 ppm D.O. at 524.68 and 8.29 ppm at the surface in late August and early September and stayed relatively low until into October. The dissolved oxygen curves for day 225 show an increase in oxygen levels from the bottom (elev. 537.65) to

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1/ Philadelphia District, Stratification Curves (APPENDIX B)

elevation 612.65. From elevation 612.65 (D.O. 7.99 ppm), the dissolved oxygen drops gradually to approximately .3 ppm at elevation 537.65. A stratified layer existed at that time from elevation 537.65 to approximately elevation 612.65.

Generally the dissolved oxygen levels are adequate for aquatic life at all levels during the year. The stratification does not eliminate oxygen completely and concentrations return to acceptable levels with the fall rains and operation of the water quality gates to draw water from the hypolimnion.

(4) pH. pH essentially remains in the range normally found in surface waters in Northeastern Pennsylvania.

(5) Total Dissolved Solids (TDS) and Specific Conductance. The TDS and Specific Conductance curves follow rainfall except for the in-lake stations, these curves below show a lag time allowing for flow into the reservoir. Station B-4 shows the influence of Wild Creek and Penn Forest Reservoirs by reducing peaks and valleys. This is particularly noticable in the spring and fall when water is being impounded for drinking. Station B-5 fluctuates the most since most of land area above this station is under cultivation and the effect of the reservoir is minimal. The moderating effect of the reservoir is most noticeable at station B-3 when the peaks and valleys of the concentration curve are of a longer duration. The peak in late September is probably due to the fall overturn but not enough data is available to confirm this.

(6) Coliform Sampling. The coliform counts at Beltzville Reservoir remained within the limits established by the Pennsylvania Department of Environmental Resources of no more than a geometric mean of 200 colonies per 100 milliliters of sample on five different days for fecal coliform and no more than 5,000 per 100 milliliters of sample for total coliform. The highest counts follow a period of rain, particularly after a prolonged dry spell. This indicates that most of the coliform load is the result of runoff carrying material into the water rather than a point source. Fecal Streptococcus testing results indicated medium to high readings during July. The coliform counts from the swimming area remain within the limits the Pennsylvania Department of Environmental Resources has established for public swimming areas.

5-02. Fishery. Pohopoco Creek is considered one of the best trout streams in the State. Trout fishing in the impoundment area of the Creek has decreased due to the habitat change resulting from the lake. However, the Pennsylvania Fish Commission has stocked the lake five times since the impoundment opened in 1972 and intends to continue the program at the lake. During 1980 the Commission stocked the reservoir with smelf, fry and walleye.

Beltzville Reservoir will provide the best fishing if managed as a salmonid-walleye-smallmouth bass lake since dissolved oxygen conditions are suitable for these fish while steep slopes limit other species. Walleye populations are excellent, with yellow perch providing the principle forage. Successful salmonid fishing might be dependent upon development of a suitable forage base. Small-mouth bass populations should improve naturally Although this lake was noted for its muskellunge, this was probably primarily a result of the great potential

for growth provided by new impoundments. Muskellunge will probably not play as important a role in the future.

1980 PENNA. FISH STOCKING AT BELTZVILLE LAKE

Reservoir	-	312,500 smelf, fry	May 7
Reservoir	-	28,000 5'7" Wayyaye	September 4

SECTION VI - RECOMMENDATIONS AND PROPOSED STUDIES

6-01. General. The following recommendations are made relative to the Water Quality Control Management Program at Beltzville Lake.

a. Maintain present sampling frequency to maintain a meaning for surveillance over the water quality in the lake.

b. Continue to correlate data collected from other agencies and establish their sampling locations, procedures and equipment used for testing.

c. Continue cooperation with the Pennsylvania Fish Commission in the management of the lake and to improve fish habitat both in the lake and downstream from the dam.

d. Enlist the services of the Pennsylvania DER's Water Quality Section and laboratory facilities to expand our present sampling points and test for additional chemical, bacteriological and biological parameters.

e. Maintain and improve a permanent record system of data on hand and other data obtained from all other sources. Such data can become a useful management tool and provide a means for evaluating water quality trends.

6-02. Findings and Conclusions. The sampling program will continue essentially unchanged for FY 1981 at Beltzville Lake.

From the data collected during the past year, the quality of the water in Beltzville Lake remains within the standards established by Pennsylvania (DER) and the U. S. Environmental Protection Agency and has changed little in the past year. In general, following periods of heavy precipitation there is a slight increase in ammonia nitrogen and phosphorous levels with a decrease in the pH. This is associated more with run-off from surrounding areas and is not a direct function of the reservoir. Bacteriolgical data recorded at stream inflows exceeded the standards as established by Pennsylvania DER. However, recorded bacteriological data from the beach area by Pennsylvania DER did not exceed the criteria established by that agency. This indicates that the bacteria both died off by the time the water reached the swim area and no problems were encountered in this regard.

APPENDIX A

WATER QUALITY MANAGEMENT REPORT

BELTZVILLE LAKE
BACTERIOLOGICAL ANALYSIS

		Swimming Beach		Potable Water		
				Picnic Area Day Use Comfort Station		Boat Launch Comfort Station
Sample No.	Date	East End	West End	Pine Run West		Pine Run East
1	1 June	0	0	15 Apr	0	-
2	16 June	19	2	13 May	0	0
3	22 June	2	3	16 June	0	0
4	29 June	3	4	*21 July	2	0
5	6 July	62	57	23 July	0	-
6	13 July	16	11	24 July	0	-
7	21 July	66	3	18 Aug	0	0
8	27 July	17	0	2 Sep	0	0
9	3 Aug	20	2			
10	10 Aug	0	4			
11	17 Aug	1	0			
12	24 Aug	0	1			

*Testing of 21 July was followed by two consecutive days of zero coliform counts.

Betz • Converse • Murdoch • Inc

A Report Of

Water Quality Monitoring

At

Three Corps of Engineers Lakes

Work Order No. 7

Contract No. DACW61-79-D-0013

Performed For

The Philadephia District

U.S. Corps of Engineers

Prepared By:

Robert M. Hardy
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BETZ•CONVERSE•MURDOCH•INC.
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Introduction

The work described herein pertains to gathering water quality samples at three Corps' lakes in the Delaware River watershed in Pennsylvania. The three lakes are Prompton near Honesdale, F.E. Walter near Stoddartsville, and Beltzville above Lehighton. This report presents the semi-annual summary of data collected between March 20 and September 15, 1980.

Water quality samples are collected on a year-round basis by Betz•Converse•Murdoch•Inc. (BCM) personnel twice per month from April through November and once per month for the remainder of the year. These samples are analyzed in BCM's laboratory for total dissolved solids, ammonia, nitrite, nitrate, phosphorous and Biochemical Oxygen Demand. All analyses are performed in accordance with the current procedures approved by the United States Environmental Protection Agency. BCM technicians sample temperature, dissolved oxygen, specific conductance and pH in the field while collecting samples for laboratory analyses. Bacteriolcgical samples are collected at ten of the sites periodically and are also analyzed at BCM's laboratory. Several times during the year water samples from public drinking water fountains are taken and analyzed for bacteriological parameters (April, June and August). All samples are delivered to the lab within 24 hours (most within 8 hours). Samples are preserved by refrigeration from collection to analysis.

Data and Results

The following tables and graphs present the data collected from the three lakes and their tributaries (13 stations) during the period March 20, 1980 to September 15, 1980. Drinking water samples were taken April 17, 1980, June 19, 1980 and August 13, 1980 at the following four sites:

1. office at Prompton
2. office at F.E. Walter
3. building near dam at F.E. Walter
4. office at Beltzville

Since there was no evidence of any fecal coliforms or total coliforms in any of the twelve (four sites - three times) drinking water samples collected this year to date, no tabular presentation of these results is made.

The results indicate that all three lakes remain in relatively good water quality and may, in fact, be improving based on the data presented in the 1978 and 1979 annual Corps' reports. The only levels that were slightly elevated were the March 20 phosphorus samples at Prompton Lake. These readings were probably due to lake turnover releasing bottom sediment nutrients or due to a storm event and should be considered a natural occurance similar to that which occurred in March of 1979.

APPENDIX 3

BELTZVILLE LAKE

WATER QUALITY DATA

WATER QUALITY DATA BELTZVILLE LAKE 1980

Sample Date	Site #	BOD	TP-P	NH4-N	NO3-N	NO2-N	Dissolved Solids	DO	pH	Temp	Cond	Fecal Coli	Total Coli	Fecal Strep
3/20	1	2	<0.01	0.22	0.72	<0.01	45	14.0	7.2	5	40			
3/20	2	2	0.01	0.12	0.18	<0.01	86	11.0	7.0	8	85			
3/20	3	1	0.04	0.13	0.76	0.01	53	13.8	7.2	5	46			
3/20	4	1	0.04	0.15	0.76	0.04	49	12.9	7.1	10	43			
3/20	5	1	0.02	0.13	1.78	<0.01	45	7.6	6.8	10	50			
4/3	1	<3	<0.01	0.28	0.75	0.01	38	13.8	6.8	7	51			
4/3	2	<3	<0.01	0.22	0.15	0.02	32	12.0	7.0	8	52			
4/3	3	<3	<0.01	0.23	0.55	<0.01	20	11.4	6.8	8	51			
4/3	4	<3	0.02	0.18	0.74	0.01	9	11.2	6.0	10	38			
4/3	5	<3	0.02	0.24	1.15	<0.01	32	11.4	7.0	9	49			
4/17	1	<3	0.04	0.12	0.88	0.03	32	13.9	6.9	8	50			
4/17	2	<3	<0.01	0.11	0.10	0.01	59	12.0	6.7	9	60			
4/17	3	<3	0.02	0.12	0.76	0.01	39	10.6	7.1	9	50			
4/17	4	<3	0.02	0.13	0.61	0.01	64	12.6	6.8	11	45			
4/17	5	<3	0.02	0.10	1.10	<0.01	59	12.4	7.1	8	45			
5/8	1	2	<0.01	<0.10	0.65	0.05	36	6.6	6.8	15	35			
5/8	2	2	<0.01	<0.10	0.57	0.02	68	6.7	7.0	17	40			
5/8	3	2	0.02	<0.10	0.57	<0.01	125	7.0	6.8	14	45			
5/8	4	<2	0.01	<0.10	0.11	<0.01	21	6.8	6.0	14	30			
5/8	5	2	0.02	<0.10	0.73	<0.01	81	6.9	7.0	13	45			
5/29	1	<2	<0.01	0.12	0.47	<0.01	41	10.2	7.1	12	42			
5/29	2	<2	<0.01	<0.10	0.13	<0.01	33	10.0	7.0	13	33	5	180	2
5/29	3	<2	<0.01	<0.10	0.40	0.01	47	8.4	7.1	21	50	1	56	23
5/29	4	<2	<0.01	0.11	0.06	0.01	28	12.2	7.1	8	50	4	28	7
5/29	5	<2	<0.01	0.11	0.04	<0.01	43	9.8	6.7	11	45	4	15	5
6/19	1	<2	<0.01	0.10	0.42	<0.01	37	10.0	7.2	15	43			
6/19	2	<2	<0.01	<0.10	0.08	<0.01	19	10.2	7.0	15	34	14	25	0
6/19	3	<2	<0.01	<0.10	0.40	<0.01	28	8.6	7.0	23	52	10	45	0
6/19	4	<2	<0.01	<0.10	0.04	<0.01	19	11.8	6.7	10	22	10	50	0
6/19	5	<2	0.04	<0.10	0.61	<0.01	38	9.5	7.1	16	47	23	65	0
7/3	1	4	<0.01	<0.10	0.38	<0.01	35	9.2	7.0	18	45			
7/3	2	4	<0.01	<0.10	0.19	<0.01	21	9.4	6.5	16	36			
7/3	3	5	<0.01	<0.10	0.38	<0.01	28	8.0	6.5	24	51			
7/3	4	5	0.02	<0.10	0.38	<0.01	69	8.5	6.0	16	41			
7/3	5	5	<0.01	<0.10	0.58	<0.01	38	8.7	6.5	19	50			
7/17	1	<2	0.02	<0.10	0.31	<0.01	54	9.6	7.2	22	55			
7/17	2	<2	<0.01	<0.10	0.31	<0.01	39	10.0	6.9	27	48	0	1300	25
7/17	3	<2	0.02	<0.10	0.10	<0.01	24	9.0	6.7	22	57	180	1200	120
7/17	4	2	0.09	<0.10	0.31	<0.01	34	8.2	6.6	18	49	220	1400	163
7/17	5	<2	0.05	<0.10	0.10	<0.01	27	8.3	6.6	19	50	180	900	140
7/30	1	<2	<0.01	<0.10	0.54	0.01	119	10.0	6.8	17	43			
7/30	2	<2	<0.01	<0.10	0.14	<0.01	30	9.2	6.8	18	36			
7/30	3	<2	<0.01	<0.10	0.40	<0.01	28	8.0	6.9	27	57			
7/30	4	<2	0.02	<0.10	0.40	0.02	59	10.2	6.7	16	42			
7/30	5	<2	0.02	<0.10	0.83	0.02	44	7.8	6.6	21	77			

All units are mg/l except: pH in pH units, Temperature in degrees centigrade, Conductivity in umhos/cm and the bacteriological results in #/100 ml.

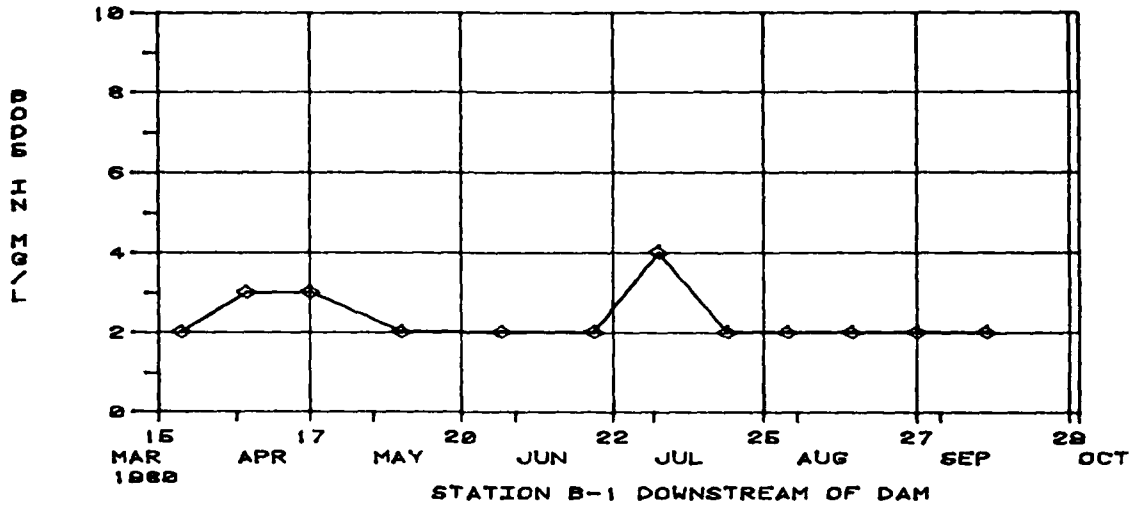
WATER QUALITY DATA — BELTZVILLE LAKE — 1980

Sample Date	Site #	BOD	TP-P	NH4-N	NO3-N	NO2-N	Dissolved Solids	DO	pH	Temp	Cond	Fecal Coli	Total Coli	Fecal Strep
8/13	1	<2	<0.01	0.21	0.55	0.04	47	8.9	6.6	18	43			
8/13	2	<2	<0.01	0.11	0.13	0.08	51	7.8	6.8	19	34	18	120	30
8/13	3	<2	<0.01	<0.10	0.34	0.08	45	7.3	6.9	27	53	5	25	10
8/13	4	<2	0.03	<0.10	0.31	0.08	43	9.0	6.6	18	38	290	400	300
8/13	5	<2	<0.01	<0.10	0.68	0.12	72	7.9	6.6	22	55	70	100	30
8/27	1	<2	0.02	0.12	0.71	0.02	36	11.4	5.6	12				
8/27	2	<2	0.02	<0.10	0.11	<0.01	24	9.2	5.9	18				
8/27	3	<2	0.05	<0.10	0.33	0.01	28	9.3	5.8	27				
8/27	4	<2	0.04	<0.10	0.33	<0.01	29	10.3	5.8	17				
8/27	5	<2	0.02	<0.10	0.71	<0.01	45	9.5	5.9	22				
9/15	1	<2	0.02	<0.10	0.48	<0.10	4285*	10.3	8.8	14	51			
9/15	2	<2	0.02	<0.10	0.39	<0.10	6974*	8.7	9.5	16	42			
9/15	3	<2	0.02	<0.10	0.64	0.10	6622*	7.2	8.6	22	58			
9/15	4	<2	0.04	<0.10	0.34	<0.10	6344*	7.6	8.7	17	42			
9/15	5	<2	0.01	<0.10	0.74	<0.10	5135*	7.9	7.8	19	68			

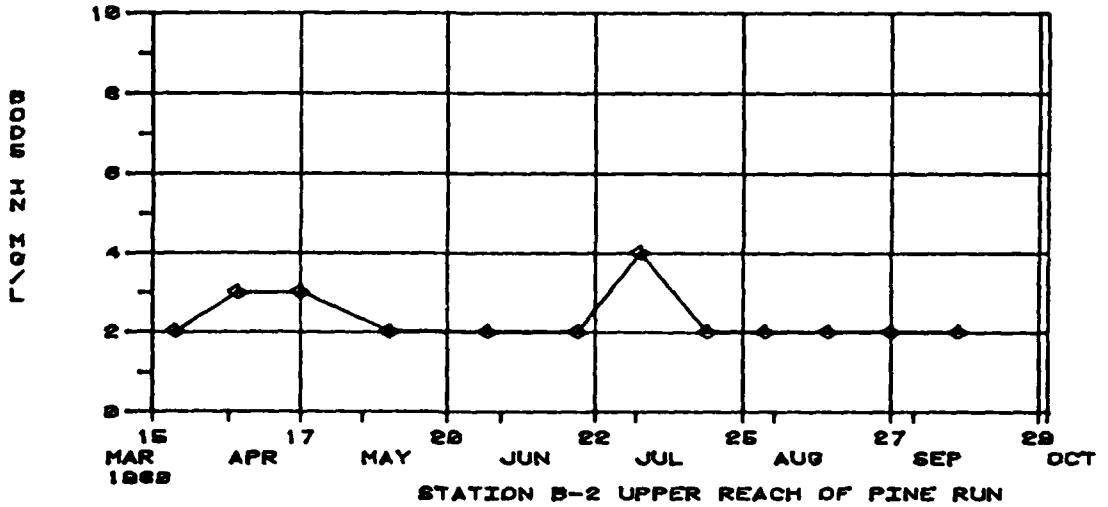
All units are mg/l except: pH in pH units, Temperature in degrees centigrade, Conductivity in umhos/cm and the bacteriological results in #/100 ml.

* Suspect contamination.

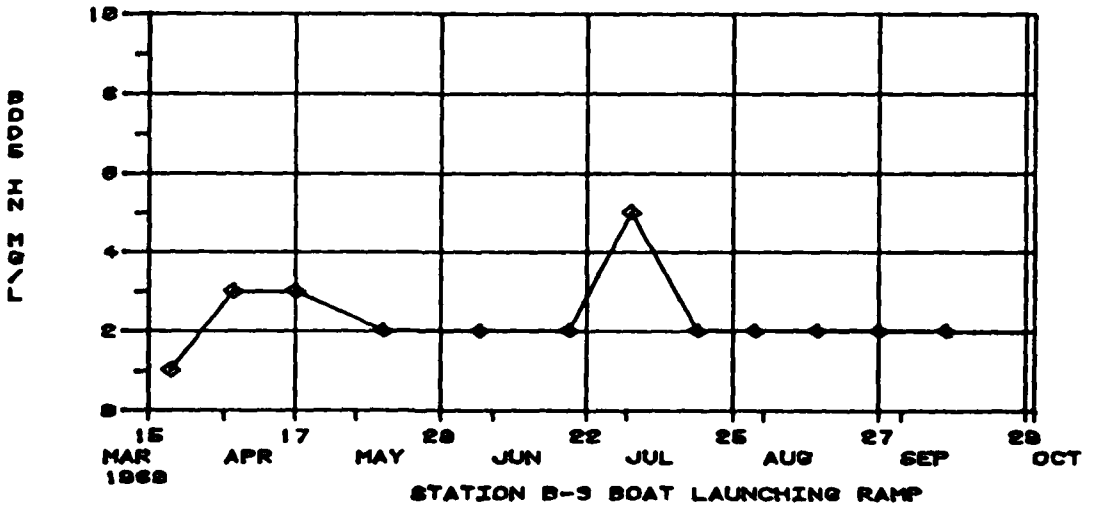
BELTZVILLE WATER QUALITY DATA FOR 1980



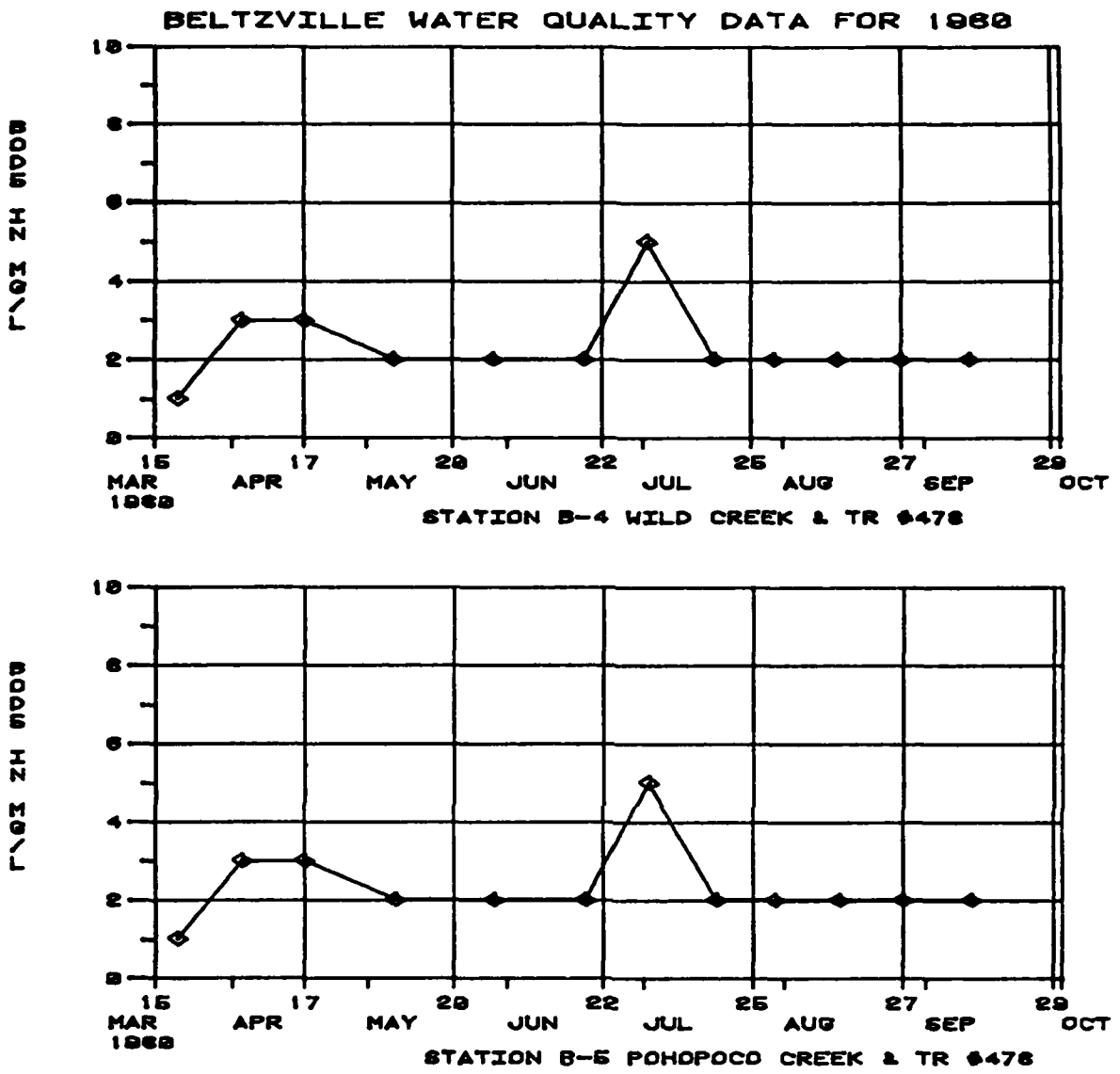
STATION B-1 DOWNSTREAM OF DAM



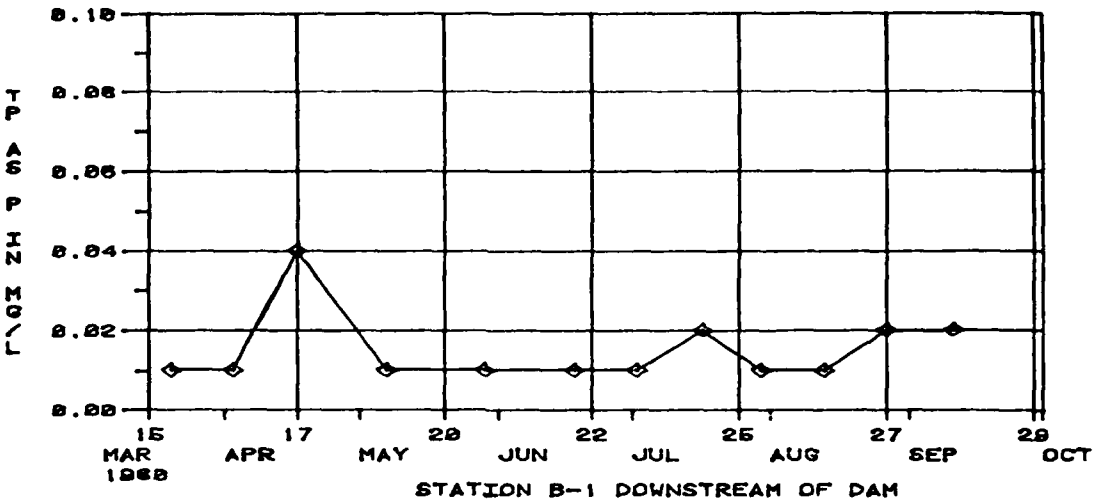
STATION B-2 UPPER REACH OF PINE RUN



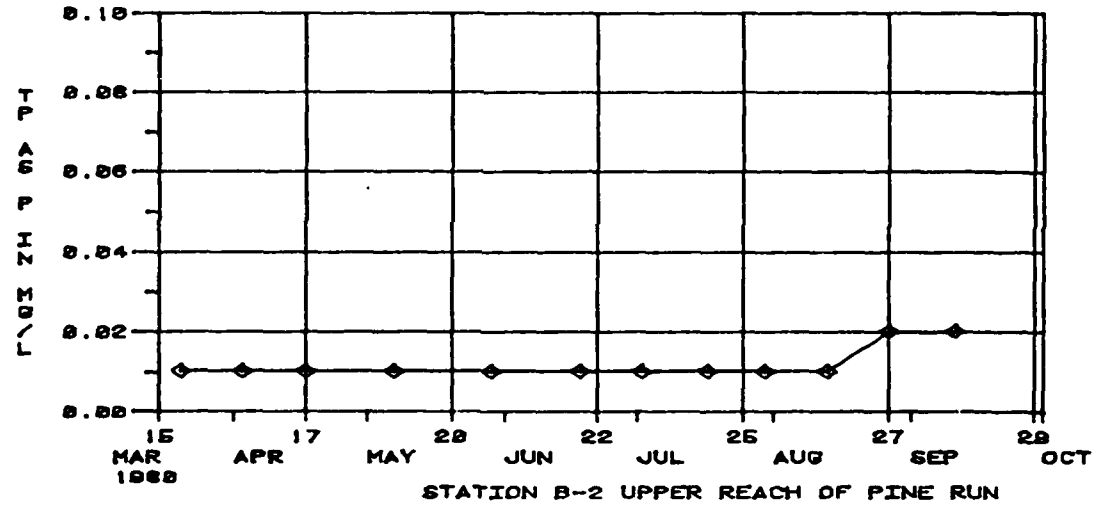
STATION B-3 BOAT LAUNCHING RAMP


BELTZVILLE WATER QUALITY DATA FOR 1980
MG/L BOD5
0
2
4
6
8
10
15 MAR 1980
17 APR
20 MAY
22 JUN
25 JUL
27 AUG
29 SEP
OCT
STATION B-4 WILD CREEK & TR #478
MG/L BOD5
0
2
4
6
8
10
15 MAR 1980
17 APR
20 MAY
22 JUN
25 JUL
27 AUG
29 SEP
OCT
STATION B-5 POHOPOCO CREEK & TR #478

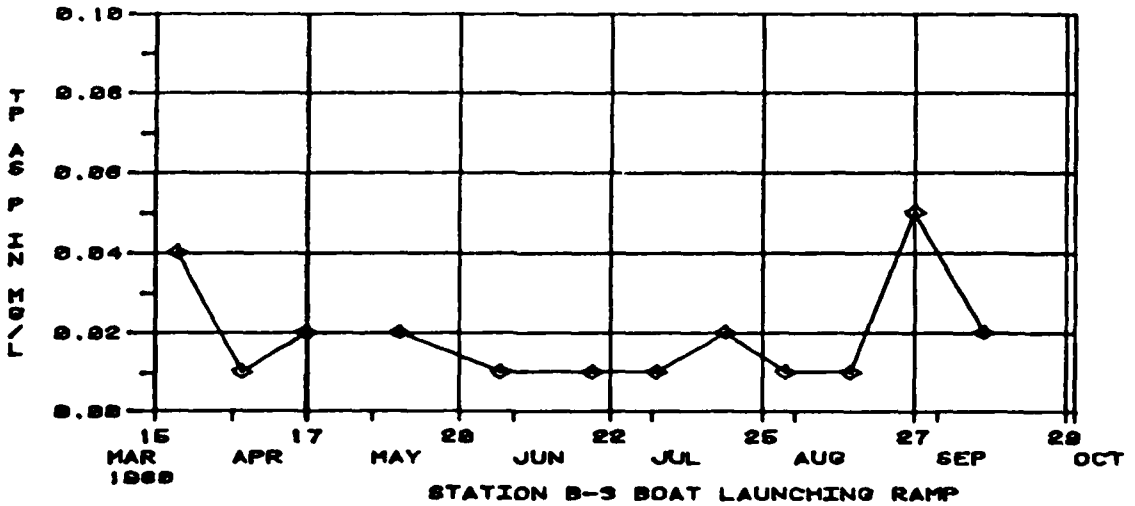
BELTZVILLE WATER QUALITY DATA FOR 1980



STATION B-1 DOWNSTREAM OF DAM

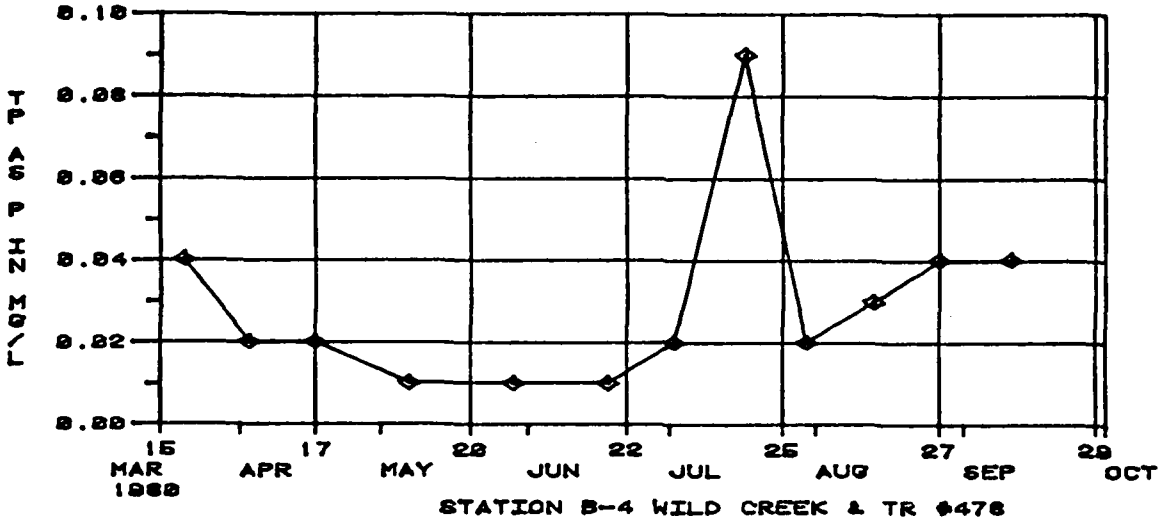


STATION B-2 UPPER REACH OF PINE RUN

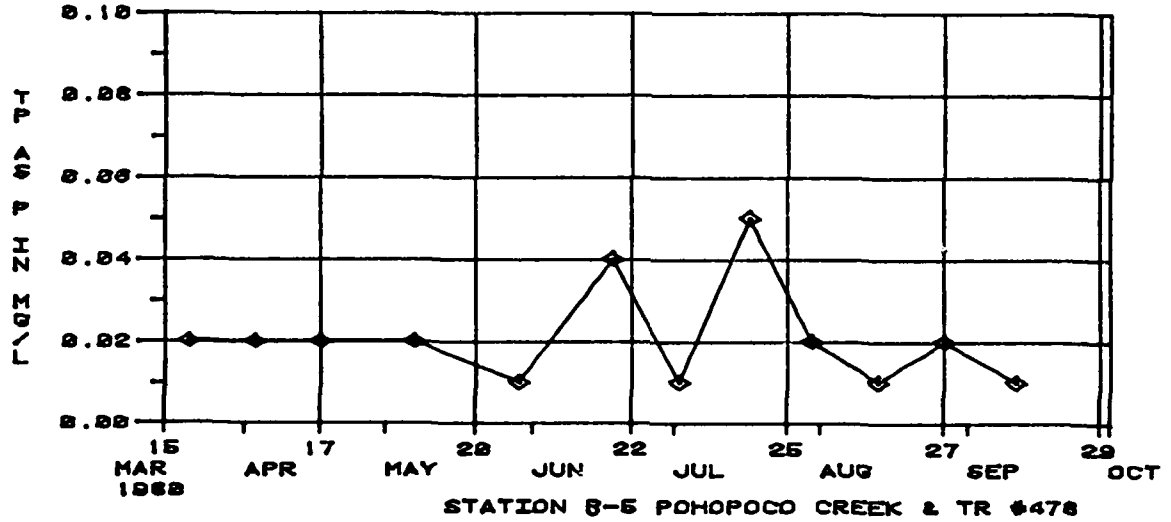


STATION B-3 BOAT LAUNCHING RAMP

BELTZVILLE WATER QUALITY DATA FOR 1980

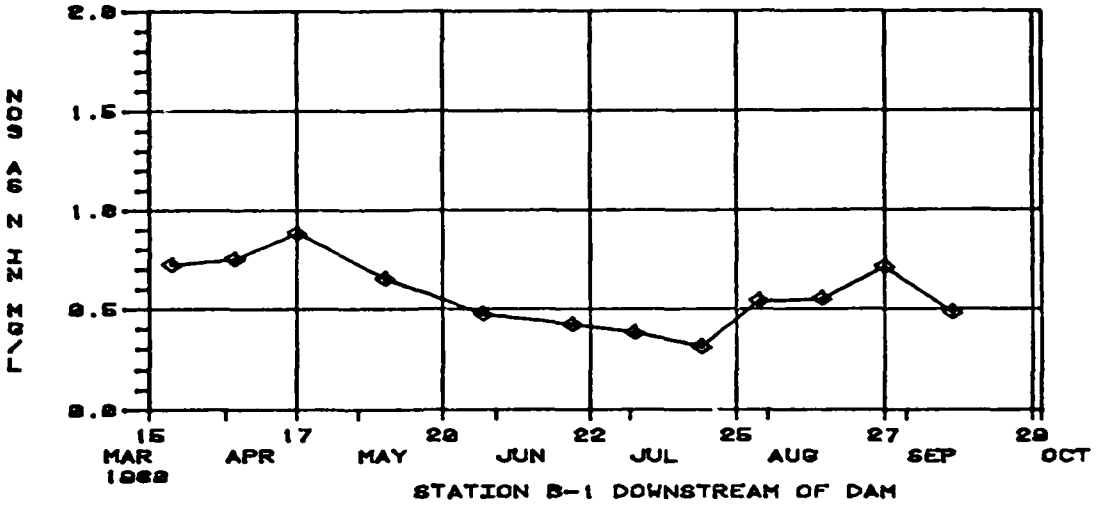


STATION B-4 WILD CREEK & TR #478

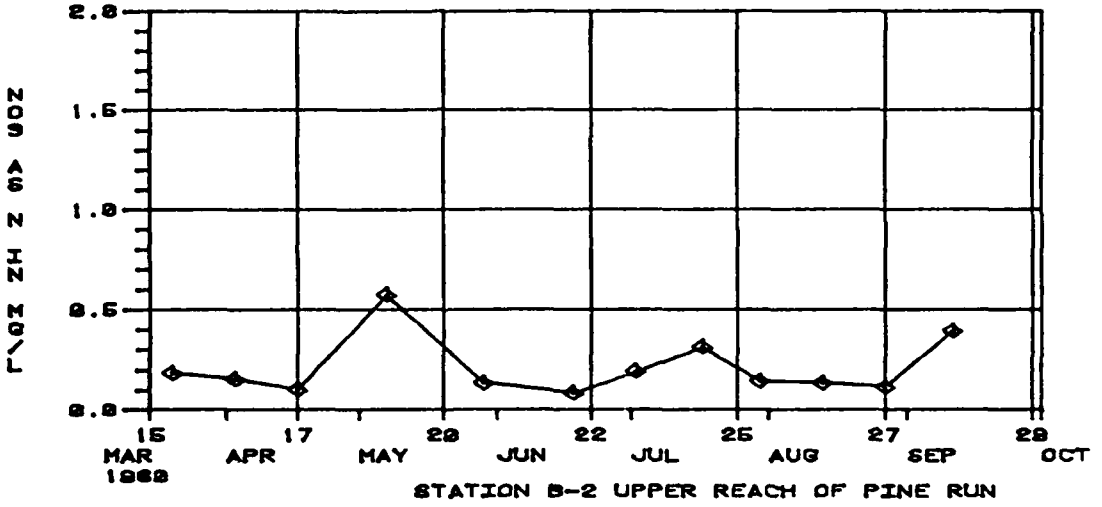


STATION B-5 POHOPOCO CREEK & TR #478

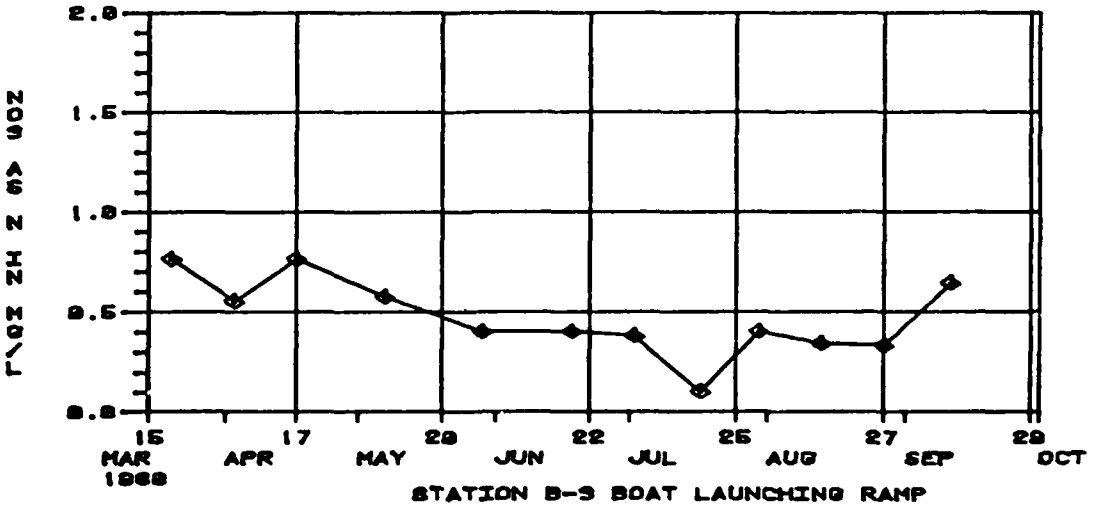
BELTZVILLE WATER QUALITY DATA FOR 1980



STATION B-1 DOWNSTREAM OF DAM

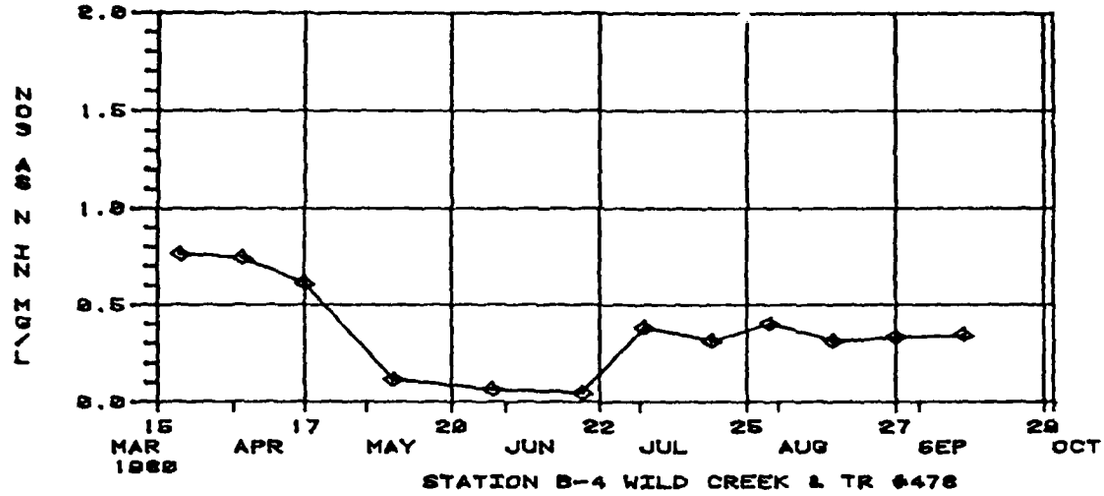


STATION B-2 UPPER REACH OF PINE RUN

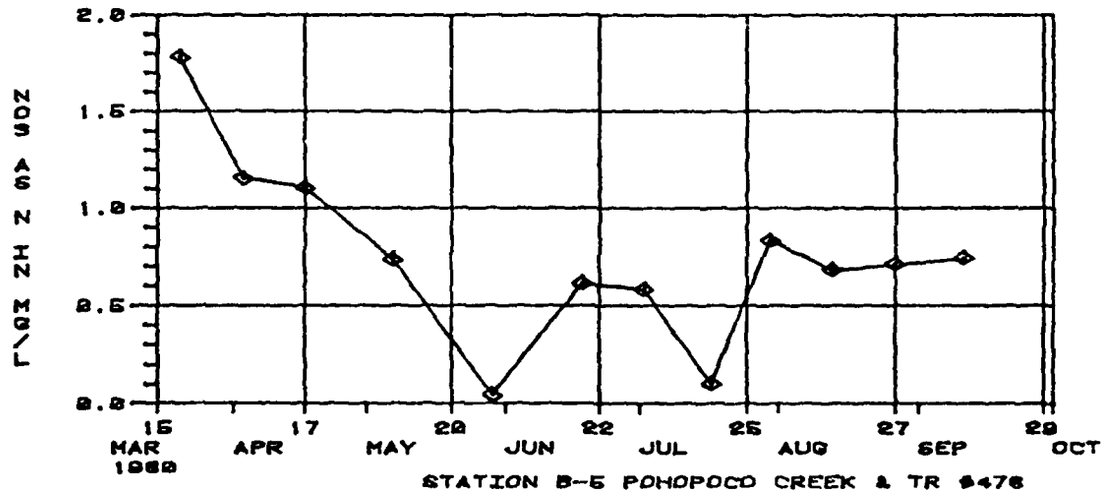


STATION B-3 BOAT LAUNCHING RAMP

BELTZVILLE WATER QUALITY DATA FOR 1980

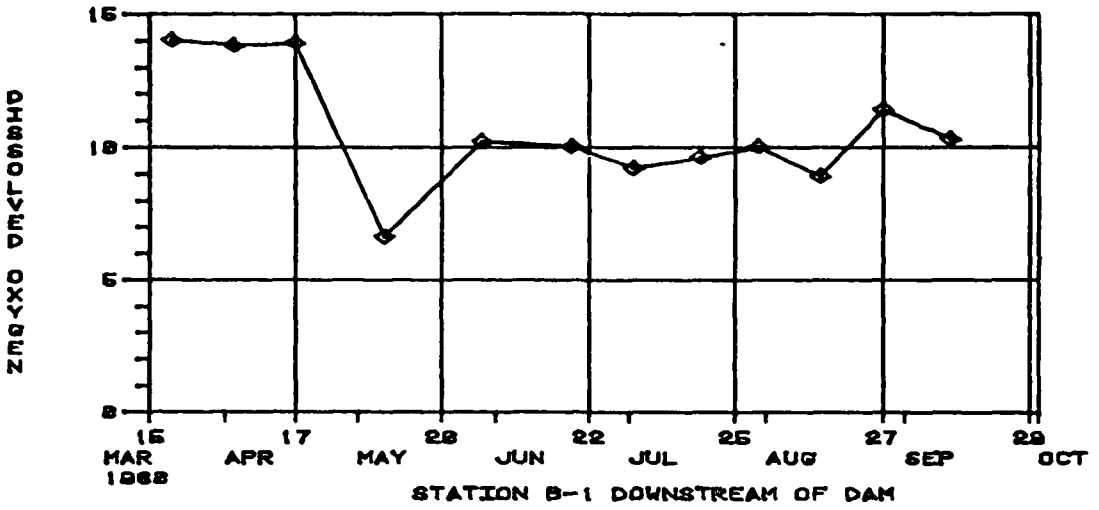


STATION B-4 WILD CREEK & TR #476

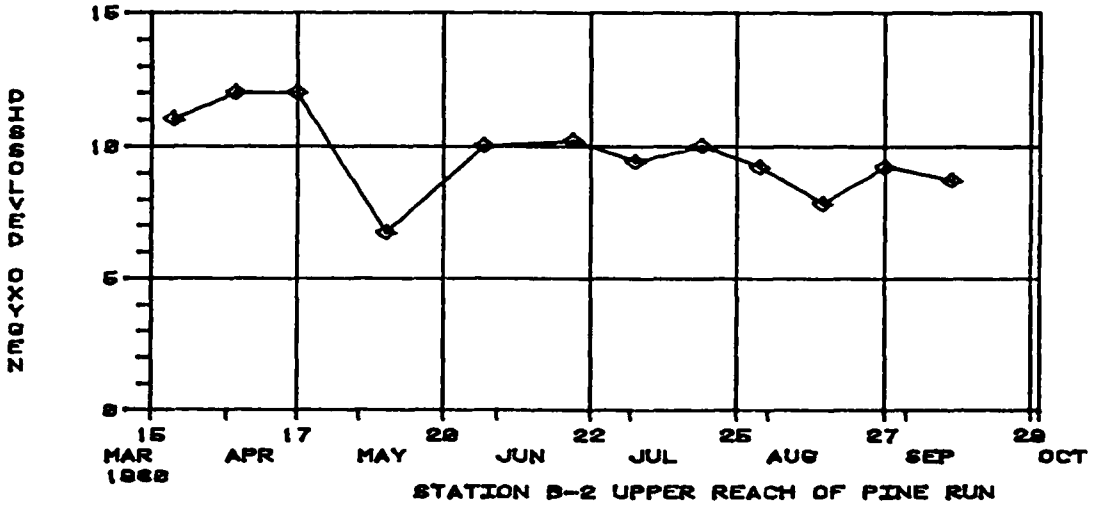


STATION B-5 POHOPOCO CREEK & TR #476

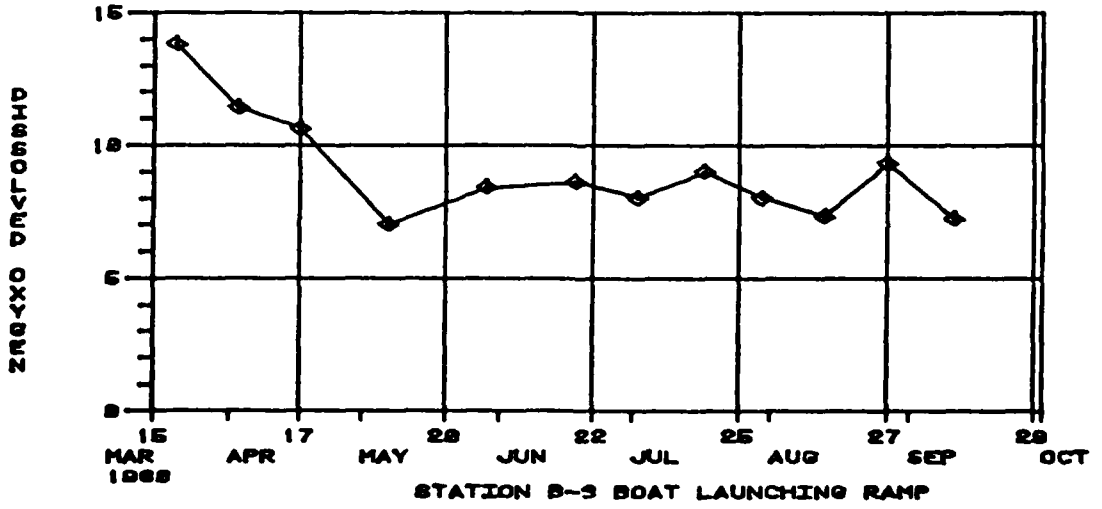
BELTZVILLE WATER QUALITY DATA FOR 1988



STATION B-1 DOWNSTREAM OF DAM

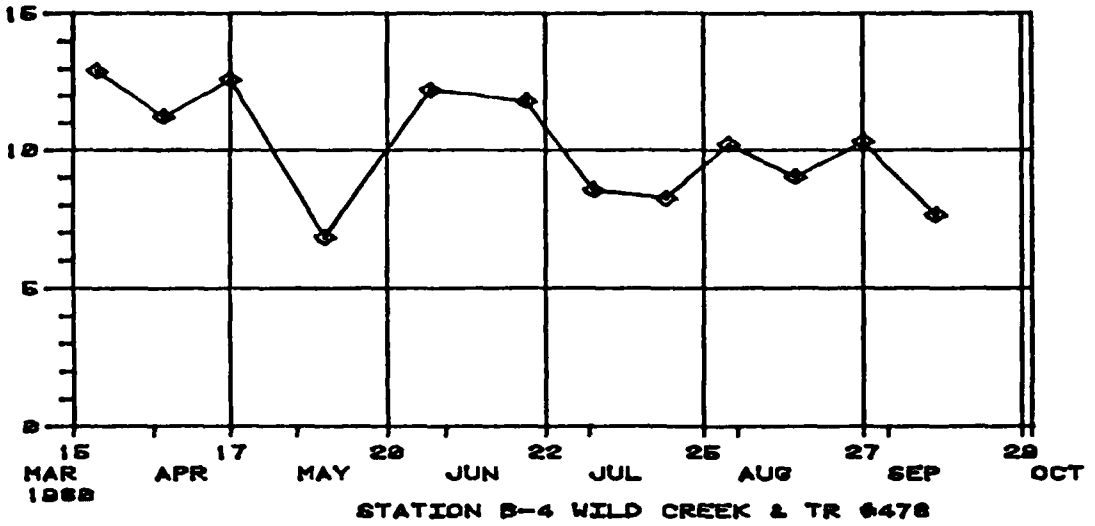


STATION B-2 UPPER REACH OF PINE RUN

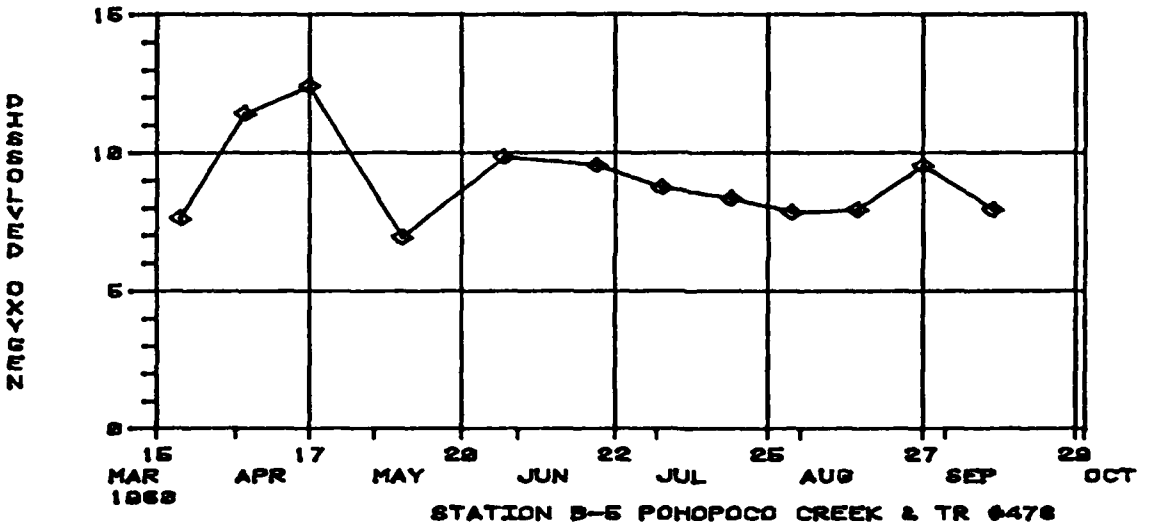


STATION B-3 BOAT LAUNCHING RAMP

BELTZVILLE WATER QUALITY DATA FOR 1968



STATION B-4 WILD CREEK & TR #478



STATION B-5 POHOPOCO CREEK & TR #478

APPENDIX B

BI-MONTHLY STRATIFICATION DATA - PHILADELPHIA DISTRICT

TABLE 1

BELTZVILLE LAKE - CLIMATOLOGICAL DATA - 1980

TABLE 1

BELTZVILLE LAKE

CLIMATOLOGICAL DATA - 1980 JAN TO JUNE 1980

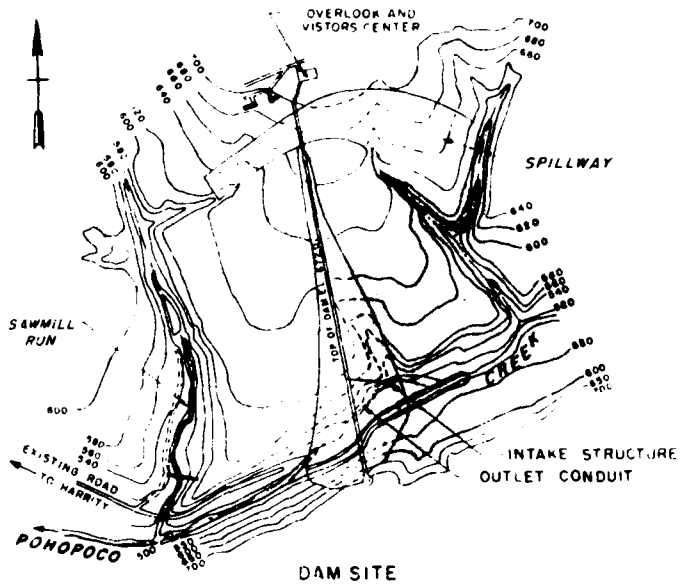
	Precipitation (inches)	Snow (inches)	Avg. Temp. (^{o}F)	High Temp. (^{o}F)	Low Temp. (^{o}F)	Days with Precipitation
Jan.	.78	0	26.9	54	8	2
Feb.	.71	0	23.4	49	3	2
Mar.	0	0	34.5	57	3	16
Apr.	5.81	2.5	49.2	74	25	15
May	3.13	0	60.1	88	31	12
June	2.93	0	64.1	91	34	10

PLATE 1

LOCATION MAP AND WATER SAMPLE
TEST SITE LOCATIONS

CORPS OF ENGINEERS

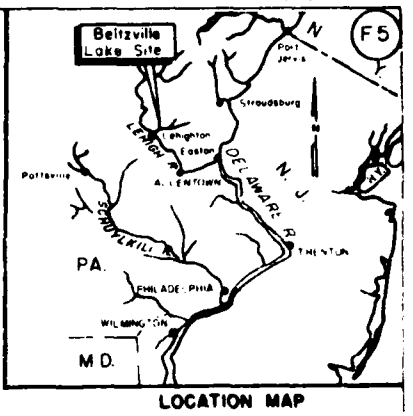
U S ARMY



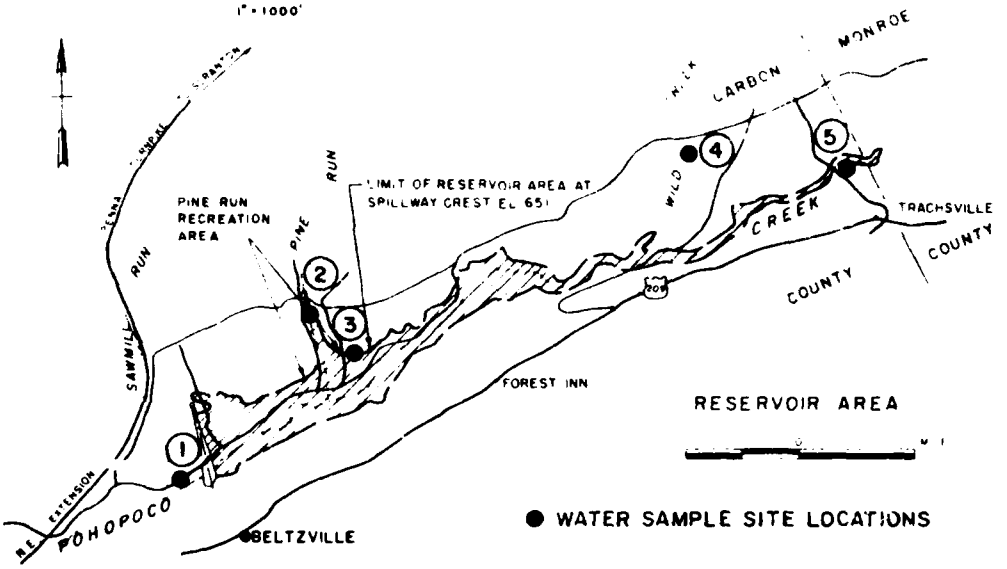
DAM SITE

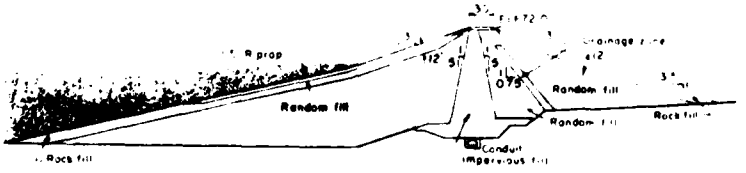
500' 0 1000'

1" = 1000'



LOCATION MAP





TYPICAL SECTION - DAM

SCALE IN FEET

50 0 50 100

POHOPOCO CREEK, PA.

FLOOD CONTROL PROJECT

BELTZVILLE LAKE

RESERVOIR AREA

PLAN AND SECTION

30 JUNE 1973

U S ARMY ENGINEER DISTRICT, PHILA

PLATE 1

PLATE 2

BELTZVILLE LAKE, POOL

ELEVATION DRAWDOWN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